A-1747
16 July 1971

U. S. Government

Gentlemen:

Enclosed for your evaluation is a copy of our proposal for modification of the optics bridge of the MLT 1540 Light Table.

If you have any questions regarding this proposal, please contact either the undersigned or [redacted] STAT

Sincerely,

[redacted] STAT

Vice President, Marketing

jwc
enc.

STAT [redacted]

MLT-1540 LIGHT TABLE

BRIDGE MODIFICATION

By

STAT [redacted]

Proposal No. A-1747

July 1971

STAT [redacted]

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MLT-1540 LIGHT TABLE BRIDGE MODIFICATION

1.0 INTRODUCTION

Two requirements relative to the use of the [redacted] MLT-1540 Light Table have recently been stated by users of these tables. These requirements are in the areas of the microscope mount and bridge and were not included in the initial specifications of the MLT-1540. Use of the light table has shown a capability in the areas of the film transport and light source far beyond that originally expected, providing an instrument which can utilize a high performance microscope bridge and mount. Specifically, the requirements for such a bridge are:

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- An improved drive to allow scanning at high magnification
- A mount capable of providing a mensuration platform including the required stability and the ability to point, i.e., align reticles with a target.

This proposal provides two alternatives for meeting these requirements. The first provides improved scanning only, the second provides both improved scanning and a mensuration platform.

2.0 ALTERNATE ONE - IMPROVED SCANNING

This modification may be applied to any model MLT-1540 with motorized bridge.

2.1 Approach

An improved scanning capability is obtained on the MLT-1540 Light Table through incorporation of circuitry providing an equalization in the X and Y speeds and smoother movement of the bridge in both the X and Y directions. This capability is accomplished through the use of detection of the bridge drive motor currents. These motor currents are fed back to appropriate control circuitry to maintain an equalization of speed and to provide a degree of constancy to the speed of the motor giving smoother bridge movement.

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2.2 Modification Description

This modification will consist of replacement of the X-Y control card. The new card will contain all of the necessary circuitry to provide the current sensing and feed back. No other modifications of the light table will be required. Control relays will not be provided with the modification card. Relays from the replaced card will be utilized in the modification, thus reducing overall material cost.

2.3 Performance Specifications

MLT-1540 Light Tables incorporating this modification will meet the following specifications:

1. Minimum starting speed — Can be adjusted on existing tables — 0.015 in./sec. ± 20%
2. Maximum X-Y speed — > .250 in./sec. OK
3. Speed variation in one axis as a function of changes in control of the other axis — ≤20%
4. Speed of X travel of bridge equal to speed of Y travel of bridge within 20% throughout entire range — OK-max speed - corr low due to #1
5. X-Y speed control dead band, i.e., from stop to start, less than 15° rotation of speed control. — No Dead Band - Requires addl pot for trim.

3.0 ALTERNATE TWO - MENSURATION PLATFORM

This modification may be applied to the model MLT-1540-4 only.

3.1 Approach

Requirements for a mensuration platform may be divided into two basic areas as follows:

1. The ability to provide a stable fixed platform for the mensuration instrument.
2. The ability to align the reticle of the mensuration instrument with an appropriate point on a target, e.g., pointing.

STAT [redacted]

Present MLT-1540-4 Light Tables provide an adequately locked platform in the X direction. The proposed modification will provide locking in the Y direction through a change in the drive point for the bridge in the Y direction thus eliminating those elements in the present drive system which introduce a slackness of movement. Drive elements from the present fail safe clutch through the cross rod at the back of the table are eliminated. The new drive point is directly to the chain attached to the bridge with drive being transferred from one side to the other through the cross rod.

If a drive capability for pointing is provided through the electrical drive system the capability for tracking is also satisfied. This approach to solution of the overall

STAT problem has been taken by [redacted] Solution to the capability of pointing and tracking combined is through the use of velocity servo drives for the bridge motion. This is accomplished by adding velocity sensing tachometers to both the X and Y bridge drive and the appropriate circuitry to maintain a constant low speed of bridge motion.

3.2 Modification Description

Modification to the Y drive point is accomplished by adding the appropriate drive sprockets and shaft supports to the chain attached directly to the bridge. The fail safe clutch is relocated between the drive motor and the drive point and the present sprocket and chain drive to the cross rod is eliminated.

Modification to the bridge drive electronics is accomplished by the addition of velocity sensing tachometers to the X and Y bridge motions, installation of appropriate harnessing to carry the signals from the tachometers to the control circuitry, and replacement of the X-Y control card with a new card containing the necessary control circuits.

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3.3 Specifications

MLT-1540-4 Light Tables which have been modified for a mensuration capability will meet the following specifications:

- X-Y minimum starting speed ~~0.001 to 0.002~~ in./sec. .005 ± 10%
- X-Y maximum speed > .250 in./sec. No Dead Band -
- Time to attain set speed ~~Without jerk OK~~ ~~0.5 to 1.0 sec.~~
- Time from release of control to stop OK 0.5 sec. or less 0.1
- ~~Speed variations in one axis as a function of changes in control of the other axis~~ < 10%
- Speed of X travel of bridge equal to speed of Y travel of bridge within 10% at speeds greater than 0.005 in./sec. X-.005 - Y-.004
- Variations in speed not to exceed 0.001 in./sec. at speeds of 0.015 in./sec. or greater
- Control of carriage speed by speed control shall be linear from minimum to maximum speed positions.
- Movement of microscope carriage and mount when locked in X and Y within the following limitations:

Pressure Applied	Allowable Movement
2 lbs.	.010" Varies across Carriage
4 lbs. — OK	.020"

Measurement method is as follows:

- A specified force applied in plus direction
- Deflection gage zeroed with force applied
- Specified force applied in minus direction
- Deflection read with minus force applied.

- Force for manual movement of carriage in X and Y directions will be as low as possible commensurate with the above requirements not exceeding 4 pounds.

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4.0 STATEMENT OF WORK

4.1 Alternate One

In providing the modification proposed in Section 2.0 of this proposal [redacted] STAT

STAT [redacted] will:

1. Provide printed circuit boards without relays which will contain the necessary circuitry for performance of the MLT-1540 in accordance with specifications listed in Paragraph 2.3.
2. Install and checkout each of the modifications.
3. Revise present ATP to include new features.
4. Begin delivery within 12 weeks after receipt of order.

4.2 Alternate Two

In providing the modifications listed in Section 3.0 of this proposal [redacted] STAT

STAT [redacted] will:

1. Provide a modification kit to modify the MLT-1540-4 for performance in accordance with the specifications listed in Paragraph 3.3.
2. Install and checkout each modification.
3. Revise present ATP to include new features.
4. Begin delivery within 12 weeks after receipt of order.

5.0 TERMS AND CONDITIONS

The terms and conditions of this proposal shall be as mutually agreed upon

STAT under [redacted]

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